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AGRICULTURAL JOURNAL

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So many requests are received from abroad for parts of the *Agricultural Journal* which were never published that the following list of all issues is given for reference. Attention is directed especially to Volume VII which had only one part:—

Vol.			*Vol.*		
I	3 numbers,	1928	VIII	4 numbers,	1935–7
II	4 ,,	1929	IX	4 ,,	1938
III	3 ,,	1930	X	4 ,,	1939
IV	4 ,,	1931	XI	4 ,,	1940
V	2 ,,	1932	XII	4 ,,	1941
VI	2 ,,	1933	XIII	4 ,,	1942
VII	1 number,	1934			

ISSUES OF THE AGRICULTURAL CIRCULAR.

THE following were the numbers and year of issue of the *Circular*:—

Vol. 1, 1920, 12 numbers.
,, 2, 1921, 5 ,,
,, 3, 1922, 4 ,,
Vol. 4, 1923, 1 number.
,, 5, 1924–5, 2 numbers.

As number 4 of Vol. 3 was printed as "Volume 4" and number 1 of Vol. 4 as "Volume 5" it would appear from an inspection of a complete set that Volume 4 comprised only a number 4 and that there were two issues of Volume 5, Part 1.

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1. Sisal Hemp in Fiji, 1911.
3. Rhinoceros Beetle in Samoa, 1912.
4. The Banana in Fiji, 1912.
5. Scale Insect on Bananas, 1913.
6. Lemon Grass, 1913.
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    Fijian Plant Names, 1942. Price 3s. 6d., 4s. and 6s.

Applications should be made to the Librarian, Department of Agriculture, Suva, Fiji.

—EDITOR.

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ERRATA—Volume 14, No. 2—
Page 31, line 2. For " Imperial " read " imported ".
Page 60. January rainfall: for 1·71 read 1·69 and June: 8·53 read 8·32.

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AGRICULTURAL JOURNAL

ISSUED BY THE

DEPARTMENT OF AGRICULTURE, FIJI.

VOL. 14.] SEPTEMBER 1943. [No. 3.

EDITORIAL.

THIS issue of the *Journal* begins with the Annual Report of the Department of Agriculture for 1942 which should prove interesting reading. This is followed by a brief outline of the development of the Veterinary Services of the Colony. In plans for the improvement of the standard of living in the Colony, both from the point of view of nutrition and of income, the encouragement of mixed farming must occupy a prominent place so that the care of stock assumes a most important aspect.

When victory is complete, existing industries will only absorb a small proportion of returned soldiers so that the development of new industries, however small, should be encouraged provided that they can compete resonably closely with imported goods. The best chances of success appear to be in the development of agricultural projects which are complementary to the raising of stock and agriculture generally, such as bacon and ham curing, leather and leather goods, tinned milk and butter, tinned fish, fibre board, timber, timber and cane furniture, fertilizers, rope, stock feeds, salt, brewery, yeast, etc. Hence the present value of the Veterinary Division of the Department is likely to become increasingly enhanced in the near future to provide additional dairying and working stock, etc. To indicate its present value some of the more important achievements of the Division are mentioned in this article which should prove of considerable interest, especially to local readers.

With the present optimistic trend of events in all war zones, attention will naturally begin to focus on reconstruction after the war and already a committee has been formed to consider what early steps can be taken to assure the future of ex-soldiers and also of all those who performed necessary services on the home front in food production, in administration and in other essential directions. The first step is naturally a full examination of local resources and an estimate of our capacity to develop these resources in a reasonable period of time.

A bold, clearly defined programme, embracing the development of local secondary industries and their immediate operation is indicated and should result in a more balanced economy for the Colony, a wider opportunity for its people and in raising the standard of living. A satisfactory internal economy and the studied consideration of the welfare of the indigenous people is likely to develop confidence with the people as well as contentment.

Under " Veterinary and Fishing Notes ", several interesting articles are given in regard to the supplies of fresh animal foods which should interest all readers. The Pig Fattening Scheme, primarily planned to utilize camp waste food, recently established at Lami, has already proved successful in substantially increasing the amount of fresh pork available to Suva. The future prospects are definitely good as it is anticipated that in 1944 the scheme will provide over 600 pigs for the local meat market. The sties at Lami afford a good demonstration of pig-fattening methods and should be inspected by all who are interested in pig raising.

Poultry keeping in Fiji has always been subject to difficulties such as losses caused by mongoose, various diseases, setbacks from wet weather, lack of knowledge and the availability of suitable feeds, etc., so that the demand for poultry and poultry products has always greatly exceeded the supply. The shortage has always been accentuated in the hot weather when it was customary to import eggs in peace time which under existing war conditions was not possible, so that in the last hot season the shortage was really acute.

Substantial efforts are in progress at Nasinu Agricultural Farm and through other multiplication centres to meet the shortage, and it is anticipated that in next hot weather we shall be the better prepared to meet the seasonal shortage of eggs. At the same time it is strongly recommended that all who can, should keep a few birds at least which may be fed on kitchen waste and thus assist in the general effort to increase production.

Local fish supplies have diminished materially since the beginning of the war owing to lack of fishing boats, nets and other fishing gear, and shortage of fishermen who have been absorbed into the Forces, but it is hoped that efforts which have recently been made to rectify the position will shortly prove effective. In the note on local fish supplies mention is made of some of the methods adopted to improve the supply situation and render it possible to make more use of the vast supplies in the ocean which surrounds the Colony.

Under " Entomological Notes " is an article on the recent spread of the cabbage white butterfly in Australia and reasons for the local embargo on ordinary importation of cabbages from New Zealand. The enormous increase in construction of native type buildings has given ideal conditions for the development of the bamboo borer which causes both damage and inconvenience, the latter taking the form of a shower of fine dust which settles on the floor and tables.

The recent outbreak of dengue in Suva will long be remembered both by sufferers and by employers of labour. Such an epidemic does more to make people mosquito-conscious than any amount of articles in the press, talks over the air or posters. It is hoped that the attention now being given by householders or house occupiers to removal of tins and bottles, uncovered barrels or choked gutters will not be relaxed simply because the outbreak has ceased. The notes on larvæ of the Culicine mosquitoes will be found interesting if only because it shows that Fijian waters have no special attribute not found elsewhere in Melanesia. Even during the drought from June to August, when only a fraction of the usual rain fell, mosquito larvæ were able to live in the teaspoonsfuls of water remaining in the leaf-bases of certain plants.

The liberation of the English parasite, introduced from the South Island of New Zealand through the kindness of the Director of the Cawthron Institute, shows every sign of giving ultimate control of the diamond back moth which is such a severe pest on cabbages.

"Agricultural Notes" comprise articles on supplies of vegetable seeds and indicates those in very short supply and those available in fair amounts. The quantity of green and root vegetables as well as of fruit which has been grown, collected and marketed for the military forces in the Colony, presents a good total and shows that our resources in this matter are really of some magnitude.

Another article shows the material extent to which sugar growers, with the encouragement of the Colonial Sugar Refining Company increased their plantings of rice and other food crops since the beginning of the war.

"Copra Notes" deal with the production by areas and demonstrates that Taveuni and Lau together produced only two-thirds of the total for Vanua Levu. The copra grading summary for the second quarter of the year shows that nearly 58,000 bags were presented for grading compared with 49,600 bags for the first quarter.

Under "Reviews" is an article showing the organization of supplies of fresh vegetables for military units in New Zealand where the grass land has first to be ploughed, women playing a large part in this work. The most recent meetings (of which details are available) of the Colonial Advisory Council of Agriculture, Animal Health and Forestry, gives an excellent conspectus of research in other Colonies. Great attention is now being paid to the part that irrigation and drainage are bound to play in post-war development. —H.W.J.

ANNUAL REPORT FOR THE YEAR 1942.

By

Dr. H. W. JACK, O.B.E., B.A., D.Sc., M.L.C.

SECTION I—GENERAL REVIEW.

Weather conditions were generally favourable to production except in the dry zone of Viti Levu where precipitation was below average, resulting in some discouragement of food plantings, particularly amongst cane farmers. The padi planting rains were late, but plantings eventually got away well. On the last day of the year a severe storm travelled across the eastern extremity of Vanua Levu, northern Taveuni and through the Lau group causing extensive loss of crop in the coconut areas, and also some damage to food plantings. Over ten million pounds weight of vegetables were supplied officially to the armed forces who however consumed very much more in hotels and restaurants and private homes.

2. Established agricultural industries, sugar, copra, bananas, pineapples have suffered severly under war conditions, more particularly in regard to shortage of labour, increased costs, shortage of tools and materials and infrequent and irregular shipping opportunities, both inter-island and overseas. There has been a very considerable expension of local demand for products no longer obtainable from overseas and to cater for requirements of the Military Forces. In the absence of any form of agricultural crop census it is not possible to ascertain the extent of planting of annual crops nor the volume of internal trade, but the production of staple food crops has greatly increased, notwithstanding the withdrawal from productive work of several thousands of Fijians.

The beef, pork and dairy industries experienced a good year and heavy demands led to slight restrictions in regard to beef and butter sales to civilians.

Pastures showed evidence of labour shortage in the second half of the year and fish supplies deteriorated for the same reason.

Aerial activity in the Forces stimulated investigation of mosquitoes with a veiw to the prevention of the arrival in Fiji of malaria carrying species.

With the falling off of mining activities no assays were made during the year but chemical activities were much concerned with military problems.

Principal Export Crops.

Sugar.

3. Weather conditions were favourable and the crop provided a better outturn than had been expected. Labour and shipping difficulties resulted in delays in crushing. As a direct outcome of war conditions a considerable reduction in crop for 1943 is anticipated. The Colonial Sugar Refining Company has submitted the following figures for the period July 1941 to June 1942: area cropped 52,879 acres, cane crushed 1,070,488 tons, sugar exported 90,778 tons.

Copra.

4. Exports amounted to 16,861 tons valued at £252,544. Increased prices following the extension of the war to the Pacific provided a stimulus to production, the local buying price rose from £6 10s. to £16 for Plantation grade. Before the close of the year a downward tendency in production was evident, due to shortage and rising costs of labour and materials, and exports were only 2,000 tons over the 1941 figure.

5. The local purchase and export of copra was taken over by Government as from the 18th February.

6. A good price was offered for coconut shell charcoal, and the Colonial Sugar Refining Company made kilns available, but production remained low owing to shortage of labour.

Bananas.

7. Exports amounted to 91,673 cases valued at £42,400, being more than double the 1941 export in volume. Viti Levu provided 86 per cent, Lomaiviti 6 per cent and Kadavu 7 per cent of this, and 95 per cent of the fruit was grown by Fijians. Irregular and delayed shipping opportunities were the cause of anxiety to shippers and producers, while increased costs and shortage of cases, nails and other materials also added to their difficulties. In September a rise of 1s. 1d. in the f.o.b. price was granted by the New Zealand Government.

Local sales increased very largely and are estimated at the equivalent of 30,000 cases.

Pineapples.

8. Labour, shortage of canning materials and other difficulties greatly restricted operations. The local demand for both fresh and canned fruit and for juice provided an outlet for a good proportion of the crop. The quality of the fruit was good but much fruit was lost in the field on account of labour shortage.

Citrus.

9. There was a bumper crop following the loss of crop in hurricane of 1941. The export market was closed and an estimated surplus of 3,000 cases over local consumption could not be utilised.

Cotton.

10. No seed was issued and the ginneries did not operate. The local demand for raw cotton for upholstery purposes provided an outlet for nearly half of the accumulated 1939–40 and 1940–41 stocks of ginned cotton. As the supply of kapok is cut off, it may be necessary to plant cotton again shortly in limited areas.

Rubber.

11. Estates that had been out of production for many years were opened up under the stimulus of demand at rising prices. Exports totalled 208,685 lb valued at £20,000.

CROPS FOR LOCAL CONSUMPTION.

Rice.

12. There was a very considerable extension of acerage planted, the greatest increase being accounted for by plantings on cane fallows and marginal lands under the control of the Colonial Sugar Refining Company who facilitated plantings in the interests of increased food production. Weather conditions varied considerably; in the wet zone the rains were adequate and dry weather at the harvest favoured heavy cropping, but in the dry zone the rainfall was insufficient and in many localities the crop failed completely, including much of the padi planted in the cane districts. Importations of rice available to the public amounted to 1,422 tons as compared with 2,169 tons in 1941.

Maize.

13. There was a further extension of planting, though in some cases maize was replaced by peanuts. Local demand was good, both as a partial substitute for sharps and for stock and poultry food. Later in the year production was further stimulated by heavy demands for green corn by the Military Forces. There was a steady rise in price.

Groundnuts and Pulses.

14. The price of groundnuts to the grower rose from 1d. to 7d. a pound and there was considerable extension of planting, mainly at the expense of maize. The whole production was for the local retail trade and none was available for oil extraction. The production of pulses, chiefly Pigeon Pea, was greatly increased.

Tea and Coffee.

15. Tea production was maintained with difficulty, owing to shortage of labour, and an increased quantity of local coffee was delivered for local consumption.

Kapok.

16. There was an excellent demand for all the kapok that could be collected; this came mainly from Rotuma.

Bananas and Root Crops.

17. The importance of bananas as a local food crop is often overlooked but under exsiting conditions it is known that in 1942 some 50,000 cases of fruit were sold for local consumption quite apart from the quantity consumed by the Fijians themselves, which must be considerable. Banana plantings definitely diminished during the year owing to shortage of manpower in the main areas and evidence of neglect of plantation was apparent.

Dalo, tapioca and sweet potatoes were adequate to the needs of both the armed forces and the public.

Dairying.

18. The industry experienced a good year although production was slightly less than in 1941.

Butter fat purchased	572,194 lb.
Butter manufactured	670,167 lb.
Ghee manufactured	22,273 lb.

The ghee figures do not include the very large quantity made by small Indian farmers. Inability to effect weed control of pastures owing to labour shortage became noticeable during the year and largely accounts for a small decrease (6 per cent) in butter fat sales to the butter factories.

Meat Production.

19. Owing to the greatly increased demand for beef, difficulty was experienced by the butchering trade in obtaining sufficient supplies. It was found necessary to search much further afield to obtain beef supplies for the Suva market and greatly increased prices were paid to cattle raisers. Slaughter had to be restricted in order to conserve supplies as much as possible. Because of the increased prices being paid for cattle, beef production was more profitable to producers than formerly. The production of pigs for pork increased materially but demand was still far in excess of supplies.

20. Poultry supplies also dwindled somewhat during the year because of the heavy demand and because of difficulty in securing suitable food. The demand for breeding stock was heavy.

21. The following numbers of animals were slaughtered in registered slaughter houses:—cattle 8,051, pigs 2,571 and sheep 112. 9,077 hides were exported valued at £10,465.

22. Shipping difficulties greatly curtailed the import of animals, the only imports being three cattle, two dogs and nine fowls.

SECTION II—WORK OF THE DEPARTMENT.

FIELD AGRICULTURAL AND PRODUCE INSPECTION DIVISION.

Experimental Work.

23. No new experimental work was initiated, but investigations in progress were maintained with difficulty during the first part of the year. Later, increasing difficulties with experimental station labour culminating with the departure of all students at the General Experiment Station, Sigatoka, and the increasing necessity for devoting available staff, labour and land to the production of fruit and vegetables, led to a decision to abandon all experimental work. Collections of plant varieties, e.g. rice, tobacco, cotton, banana, dalo, maize, sweet potatoes, "tapa," "derris," coconuts, etc., are being preserved, many of them on a much reduced basis.

24. A survey of cacao varieties and strains existing in abandoned condition in Vanua Levu with a view to the establishment of observation plots and nurseries was commenced, but could not be completed owing to the transfer of staff to Viti Levu for work on vegetable production and marketing.

Extension Work.

25. The increasing demand for fresh produce for the Military Forces necessitated the abandonment of normal extension work and the concentration of staff on work directed to secure the maximum effort in food production,

both for growers' own consumption and for sale. Propaganda to this end was carried out by the publication of press articles, wireless broadcasts and the distribution of leaflets, but mainly by word of mouth amongst peasant farmers through the Fijian and Indian subordinate staff. Additional temporary European, Indian and Fijian staff were employed. The registration of regular growers of vegetables and fruit for the Military Forces was carried out in order to secure their exemption from other forms of service and to facilitate the issue of seed and the organization of supplies. Guarantees of purchase at fixed prices extending (for short term vegetables) over a three months period were given in order to encourage the planting of selected crops. This entailed much extra work by the field staff, particularly in view of the uncertain demands and selective purchases by military units. The importation and distribution of vegetable seeds and manures was undertaken on behalf of some thousands of small growers.

26. A special effort was made to secure an extension of acreage planted to padi. The survey of and provision of access roads to new settlements in Vanua Levu were carried out and drainage and roading was extended on the Toga rice scheme. Seed was again made available to many growers. In certain areas the encouragement of additional rice plantings had to contend with the attraction of temporary employment at highly competitive rates of remuneration.

27. Demonstration farms were maintained but were largely given over to food production.

28. Propaganda for and the demonstration of soil conservation measures had to be greatly curtailed, though existing demonstrations on stations and farms were retained.

29. The investigation of stock trespass cases and claims for compensation for damage to crops entailed in military works occupied much time. In the Suva area alone 72 stock trespass cases were investigated and 153 assessment of compensation claims were undertaken on behalf of the Military.

30. The enforcement of weed control operations in declared areas had to be abandoned during the year owing to the shortage of labour, farmers and native occupiers of land being unable to fulfil their obligations. Many native type houses were built for the armed Forces and in addition £2,500 worth of materials were supplied mainly from the Southern Division.

Agricultural Education.

31. Recruitment for fighting and labour units had an unsettling effect on agricultural students and towards the end of the year all the students left the General Experiment Station, Sigatoka. In Vanua Levu work on the three Provincial Training Farms contracted steadily on account of the reduced number of students and the abandonment of these farms was foreshadowed.

Produce Inspection and Marketing.

32. The Fields Division assumed responsibility for the organization of production and delivery of fresh vegetables and fruit to the Military Forces. Collecting depots were established and supervised at convenient points, and transport facilities were arranged wherever possible and controlled through the operation of petrol coupon pools. Invaluable assistance in the collection of produce was rendered by the Nausori Fijian Co-operative Market, the Waibula Club at Tailevu and several other groups of Fijian and Indian growers in some of the producing areas. Total deliveries for the year amounted to 4,596,621 lb of fruit and 5,933,842 lb of vegetables, valued

at £65,723. This work, including the organization of planting, represents the main effort of the Division during the period under review. Further details of deliveries, etc., will be found in the *Agricultural Journal*, Vol. 14, No. 1, of March 1943.

33. The normal functions of the Produce Inspection staff were also carried out. All banana shipments were supervised, a total of 91,662 cases being handled during the year. This entailed considerably more work than in normal times on account of the uncertainty of shipping, the shortage of cases and difficulties arising out of local conditions of transport. The export of other produce was greatly curtailed, and was limited to small quantities of fresh pineapples and ginger.

34. Copra grading was undertaken at Suva, Levuka and Savu Savu. A total of 244,614 bags were graded, of which 117,716 bags were Plantation grade and 126,898 bags of Fair Merchantable Sundried.

35. The manufacture of cheroots and cigars under the supervision of the Department was given up, but the supply of specially selected and graded leaf to a small private manufacturer was undertaken. The manufacture of trade "stick" tobacco from local native grown leaf was continued as labour supply permitted, and a total of 1,983 lb was sold, valued at £207.

36. Maize was also handled for the benefit of poultry keepers in Suva and sales amounted to approximately £200.

Entomology.

37. Attention was mainly directed to control of pests of vegetables grown for the Forces, the chief harmful insects being *Prodenia litura* F. on carrots, cabbage, lettuce, tomato, maize, dalo, and eggplant; *Heliothis armigera* (Hbn) on maize and pea; *Crocidolomia binotalis* Zell. and *Plutella maculipennis* (Curt.) on cabbages and turnips and *Hymenia recurvalis* F. on beet and spinach. Circulars in Hindi and Chinese were circulated to gardeners and treatments of pests were demonstrated.

38. Towards the control of the green vegetable bug 18,500 egg parasites (*Microphanurus basalis* Woll.) were bred and released. The total includes a consignment sent by plane to New Caledonia, which arrived in perfect condition. Besides routine local liberations of various beneficial insects a colony of *Plæsius javanus* Er. (Jepson's beetle) was sent by plane to California for release in the banana fields of Puerto Rico to control banana borers.

39. Owing to the possibility of the introduction of *Anopheles punctulatus* Dön. from Melanesia, a Mosquito Control Committee was formed and measures to be taken were defined. Paine's bulletin on the *Mosquitoes of Fiji* was re-edited and a survey of mosquitoes was initiated.

Botany and Plant Pathology.

40. The Herbarium of plants was maintained and augmented and many identifications were made for various applicants. The Botanist (Mr. B. E. V. Parham) published an index of *Fijian Plant Names* being a compilation of studies of plant life carried on for several years and of material value to the Colony. The Index brings into print some 1,300 Fijian names of plants belonging to 140 families, 370 genera and 600 species and thus provides a substantial advance in recorded information regarding the flora of Fiji.

41. Useful notes on canes, reeds and bamboos suitable for commercial purposes were also published and small supplies were furnished for a Blind Institute in New Zealand. Another lengthy and practical article was also

published by the Botanist on *Some Useful Plants of Fiji Islands*, mainly at the request of the military to whom it has proved invaluable, as well as to the general public.

42. Pathological work was confined to dealing with minor outbreaks of disease in economic crops including citrus and routine maintenance of experiments on the control of *Cercospora* leaf spot of bananas, since the officer concerned was very fully occupied with food production problems throughout the year.

Chemical Activities.

43. In order to save chemicals, essential analyses only were made so that the number of samples examined was 421 compared with 1,010 in 1941. Mining assays were eliminated, soil analysis and nutrition studies were eliminated, but work for the military forces greatly increased. Analyses performed included samples of foodstuffs, fresh and canned, explosives and explosive containers, damaged shell cases, bullets, stolen motor spirit, special aeroplane petrols, war gases, water for laundry uses and drinking, vitamin C content of fruit juices, suspected narcotics, fertilizers, blood for alcohol contents, etc. Work for the Police Department also showed a material increase, especially in regard to illicit alcoholic liquors, firearms, petrol, nitrobenzine, etc.

44. In addition a quick practical method for the estimation of moisture and free fatty acid in copra was designed by the Senior Chemist and made available to planters and was freely used by copra graders. Useful practical articles on "Vitamins" and "Observations of Soil Methods" being a record of the methods of determining phosporous and potassium in soils, were published during the year by the Senior Chemist despite the absence of qualified assistance.

45. Facilities were freely extended to officers of the U.S. Forces who made considerable use of the laboratory in studying special problems and were afforded much chemical advice.

Veterinary and Animal Husbandry Division.

46. All districts in the group were visited by Veterinary Officers or Stock Inspectors except the Lau Group. Stock raising areas were visited numerous times. Owing to the labour shortage very little developmental work was carried out in stock raising areas and few new areas were brought into production. Efforts were made by the staff to increase the production from the present areas and farmers generally have reported increased production for the year compared with previous years. The total numbers of animals inspected were:—

Horses	5,054	Cattle	2,008

47. Under the Stock Improvement Ordinance the following animals were dealt with:

Bulls—		Stallions—	
Licensed	152	Licensed	13
Ordered to be castrated .	168	Ordered to be castrated	73
Castrated by staff ..	130	Castrated by staff ..	53

Pig Fattening Scheme.

48. To meet the increased demand for pork, a pig fattening scheme was inaugurated by the Division and styes were erected on the Lami rubbish dump. Pig food for the Scheme consisted almost entirely of waste food

from the military camps adjacent to Suva. This scheme progressed a great deal during the year and at 31st December, 1942, 133 pigs had passed through the Scheme and 80 pigs had been sold for slaughter or breeding. These pigs gave a revenue of £252 4s. 2d. The value of the pigs on hand at 31st December was £406. Arrangements have been made for increasing the number of pig styes at both the Lami rubbish dump and the Nasinu Experiment Station, to make fuller use of the large amount of camp waste food which is available. Every effort has been made to induce individual farmers to increase their numbers of pigs in order to make use of camp waste food.

49. Under the Animals (Contagious Diseases) Ordinance the following tuberculin tests were carried out. Positive reactors were isolated or destroyed.

		Positive Reactors.	Per cent infected.
Cows in registered dairies in Suva re-tested	925	11	1·19
Total tests carried out in the Colony ..	5,977	529	8·852

All dairy farms which had been tuberculin tested the previous year were again tested during the year and the testing was extended to include a number of new dairy farms.

50. The following numbers of animals were ordered to be destroyed on account of diseases other than Tuberculosis:

Actinomycosis .. .. 4 Debility 24

A constant watch was maintained for animal diseases which may have been introduced with foreign foodstuffs but no such disease was found during the year.

51. In the clinic at Suva 585 cases were dealt with. At Nadi 248 cases were dealt with, making a total of 833. The pathological laboratory dealt with 185 individual specimens.

52. During the year 660 cattle brands were registered. This brings the total number of brands now registered in the Colony to 2,097.

Staff.

53. The writer desires to place on record the loyal support given and the active interest taken in the work of the Department during a difficult year by each member of the staff, including Fijians and Indians. Food production work was particularly onerous but the results were entirely satisfactory and reflect great credit on the Field Division.

54. It is also a pleasure to record that invaluable assistance was rendered to the Department by District Administrative and Engineering Officers with whom harmonious relations always existed and without whose co-operation the work amongst Fijians could not prosper.

55. The prompt and helpful co-operation of all officers of the armed forces is also recorded.

VETERINARY SERVICES IN FIJI.

By
H. W. JACK, O.B.E., B.A., D.Sc.
Director of Agriculture.

THE value of the Veterinary Services now provided in the Colony is little known and in consequence it is considered that an article on the history of the personnel and of the development of these services will prove of interest to most readers.

It appears that veterinary work in the Colony commenced in January 1907 with the appointment of Mr. W. T. Collins, M.R.C.V.S., as Veterinary Surgeon: he resigned in 1910 and returned to New Zealand where he is still on the active list as a Veterinary Officer in the New Zealand Department of Agriculture and always enjoys meeting visitors from Fiji.

In August 1910 Mr. L. P. Edward, M.R.C.V.S., was appointed to fill the vacancy and did good work until he joined the Australian Imperial Forces in 1916 and went on active service. In June 1917 Mr. G. Broom, M.R.C.V.S., was seconded to Fiji from the New Zealand Department of Agriculture but returned to New Zealand in 1918.

All the above-mentioned officers were attached to the Medical Department during their sojourn but they appear to have had no subordinate staff and no departmental record of their work is available.

The Colony was without the services of a Veterinary Surgeon for a period after the war until Colonel J. Wakefield Rainey, C.B.E., F.R.C.V.S., was appointed in July 1919 to be replaced on his retirement by Mr. M. J. Reidy, M.R.C.V.S., in December, 1920. Mr. Reidy retired in 1922 and was replaced by Mr. A. McKenzie, M.R.C.V.S., who was loaned by the New Zealand Department of Agriculture for a few months. These three officers were attached to the Department of Agriculture.

In January 1923 Mr. C. R. Turbet, B.V.Sc., M.R.C.V.S., was appointed as Senior Veterinary Officer on the establishment of the Department of Agriculture and so has completed 20 years as the veterinary authority of the Colony.

As Veterinary Services increased the following Veterinary Officers were appointed to assist Mr. Turbet, Dr. W. A. Carr Fraser, D.V.Sc., F.R.S.S., 1925–27, Mr. W. G. Bennett, B.V.Sc., 1926–28, Mr. T. T. McGrath, M.R.C.V.S., 1927–28, Mr. H. M. Stutchberry, B.V.Sc., 1928–38, Mr. H. T. B. Hall, B.V.Sc., November 1938 and Mr. R. N. Sanders, B.V.Sc., January 1939.

Dr. Fraser is now in the Western District of Victoria; Mr. McGrath died in New Zealand a few years after leaving Fiji; Mr. Bennett died last year in Tasmania and Mr. Stutchberry was transferred to Tanganyika in 1938 and is still doing good work there as a member of the Colonial Veterinary Service.

The first Stock Inspector to join the Veterinary Division was Mr. C. H. Köster who was appointed in June 1930 and has rendered good service in most Districts but was latterly attached to the General Experiment Station, Sigatoka, and functioned as Meat Inspector there as a war emergency measure in addition to his general duties.

Additional assistance to the Veterinary Division was made available by the appointment of two more Stock Inspectors: Mr. T. Gardiner in 1941, stationed at Labasa, and Mr. T. Mune in April 1943, stationed at Tavua.

In 1924 a young Fijian timidly approached Mr. Turbet stating that he wished to learn to be a " Vuniwai ni manumanu ". He added that he did not ask for wages and was content to work for nothing. The sincerity of the boy was obvious and so Saimoni Tuwai, now Buli, Nailega, Ba, was

taken on as the first student native Veterinary Assistant. He did very well in his training, leaving the Veterinary Division to take up his present occupation where his knowedge of animal husbandry has proved of great benefit to his people.

The experience gained through the observation of Saimoni Tuwai's work indicated that the idea of training natives in animal husbandry and veterinary science was sound. Consequently, the Senior Veterinary Officer set out to train natives for veterinary work though the number made available for training was small. Ten, however, were trained, three being Rotumans who appear to adapt themselves well to the work. Two of the ten have left the Veterinary Division and one is away on active service.

The Veterinary Division now maintains two clinics, one at Suva where 585 cases were examined in 1942, and one at Nadi where 248 treatments were given in the same year. There are no private practitioners in Fiji so that all animal disease and injury treatment devolves on the Government Veterinary Staff who are not allowed private practice.

The work of the Division includes the administration of the Stock Improvement Ordinance, Contagious Diseases (Animals) Ordinance, the Animal Importation Ordinance and the Brands Ordinance. In addition, advice is given in relation to certain aspects of public health, transport of cattle, trespass of cattle, pasture improvement and other matters, while the instruction of peasant farmers in animal husbandry has always been regarded as an important function of the Division.

With the exception of tuberculosis, it may be said that disease incidence in the large animals in the Colony is low and that there are no acute infectious diseases affecting these animals. Most cattle diseases are of a chronic nature, the chief ones being tuberculosis, contagious abortion and nutritional and parasitic diseases. In horses, goats and sheep, nutritional disease and parasitism are the chief ailments.

Filariasis and heart worm are very common amongst dogs. Poultry suffer from numerous diseases, including several of the classical acute infectious complaints and from various parasites. Treatment and advice on these numerous diseases occupy much of the time of the staff. The control of tuberculosis of cattle is, however, considered the most important economic animal health work performed by the Division. In this connexion it is worthy of mention that the incidence of tuberculosis in the registered dairies supplying milk to the community of Suva has been greatly lowered by the annual application of the tuberculin test which resulted in a reduction of tuberculosis infection from 18 per cent of the supplying cattle in 1931 to less than two per cent in 1935 and since that date this low percentage has been well maintained.

The application of the tuberculin test has been considerably increased in the last few years with distinctly beneficial results to the dairy industry. In 1942, 6,000 tuberculin tests were carried out.

Under the Stock Improvement Ordinance, bulls and stallions are examined annually for fitness before the issue of licences, and those that are not considered suitable for breeding purposes are castrated. In 1942 bulls castrated by the Veterinary staff and those ordered to be castrated aggregated over 300 in number and for horses the aggregate number was 126. There can be no doubt that the application of this Ordinance has had a beneficial effect on stock.

The Animal Importation Ordinance controls the importation of animals for breeding or other purposes and is designed to prevent the importation of any animals carrying diseases into the Colony. Importations are neces-

sary in order to improve local standards of animals or even to maintain them and though shipping difficulties have reduced importations temporarily, it is desirable that they should be continued again on an increasing scale as soon as circumstances permit.

The introduction of poultry of good breeds has been a feature of veterinary work in the last seven years and many good flocks are now to be found in the Colony as a direct result of distributions from selected stock at Nasinu and other stations. Quarantine regulations safeguard the Colony's stock and the animal Quarantine Station controlled by the Senior Veterinary Officer serves a necessary and useful purpose in the promotion of animal industry in the Colony.

By demonstration and by instruction, animal husbandry has been greatly improved in the Colony in the last 20 years. In this respect a notable achievement arising out of the recommendations of the Senior Veterinary Officer has been the success achieved in the keeping of pigs of good breed under conditions which eliminate disease due to infection by the kidney worm. The essential feature of the pig sties designed to meet this disease is that pigs being raised for slaughter are maintained continually on a concrete floor which can readily be washed down daily so that any kidney worm eggs have no chance of infecting the young or fattening stock. Under these conditions, it has been shown that Fiji can raise excellent pigs suitable for bacon as well as pork, so that a valuable advance has been made in pig raising for profit. Incidentally, as a war time measure to increase local pork supplies and to utilize waste foods from camps, the Veterinary Division is successfully fattening pigs on a fairly large scale. This venture is proving an excellent demonstration since it is situated conveniently to Suva and there have been many visitors.

The administration of the Brands Ordinance has enabled the Division to build up a record of animal owners which has proved of value in the control of animal thefts which have been of common occurrence, also the register is useful as a source of general information concerning animal industries.

Standardized types of housing for poultry, calves and cows, etc., have also been designed and improved by the Veterinary Division over the last few years and this advisory service has been of great utility to the Colony.

Although in all agricultural centres it is now recognized that the nature of a pasture depends mainly on the management of the farm, advice is frequently sought by farmers and is given by all officers of the Department but especially by the Veterinary staff regarding the improvement of pastures.

Another task of useful administrative value is the census of animals taken by the Veterinary Division periodically. The last census was taken in 1941 and gives the animal population as 84,344 cattle, 16,812 horses, 365 sheep, 8,695 pigs and 118,767 poultry. The Senior Veterinary Officer being wartime Controller of Meat Supplies (also dairy products and fish) now finds his census extremely useful.

The dairy industry which has developed considerably in the last two decades has been materially assisted by the Veterinary Division of the Department in many ways. Advice has been given regarding the sources of good stock, stock has often been secured for purchasers for Government stations and institutions as well as agricultural farms. Disease treatment has always been available and has saved many valuable animals from destruction, advice has been rendered in regard to the layout of farms, the best types of animal housing to erect and markets have been found for animals.

A suitable mode of road transport of animals has been designed and assistance with transport has been freely given. Interisland transport has also been greatly improved as a result of regulations largely suggested by the Senior Veterinary Officer, while the treatment of animals by their owners is always under observation and many cases of cruelty have been found and fines imposed accordingly.

Attention has been drawn to noxious weeds from time to time and advice on the proper nutrition of animals is always available on request.

The Veterinary Division is also responsible for work connected with fish and the fishing industry though to date little progress has been possible in this direction beyond assistance in obtaining equipment for two commercial fishermen who have launches fully equipped for fishing.

The great importance of mixed farming in this Colony is well known and its development must always be closely correlated with education in animal husbandry such as is provided through the field staff of the Veterinary Division which has accomplished much with very limited resources.

In the above brief notes attention has been directed to the many activities of the Veterinary Division of the Department of Agriculture and to some of the beneficial results achieved in recent years. Much more could be added to the above notes but sufficient has been written to indicate the material and increasing value of the existing Veterinary Services to the Colony and to justify its extension when circumstances permit.

VETERINARY AND FISHERY NOTES.

By
C. R. TURBET, B.V.Sc., M.R.C.V.S.,
Senior Veterinary Officer.

1. PIG PRODUCTION.

Since it has become necessary to restrict the quantity of beef being consumed, the increasing pig population has been very helpful in seeing us through these anxious times in regard to animal foods. Unfortunately, owing to labour shortage it has been necessary for a few dairy farmers to cease pig production. This small reduction in supply has been very much more than compensated for by the increase in production brought about by the efforts of Messrs. Mackay, Mackenzie, McConnell and Tarte and other Taveuni planters who are now sending in large numbers of pigs to Suva.

The Veterinary Division of the Department of Agriculture has also become commercially interested in pig production and established a pig fattening scheme. Fifteen sties have been built at Lami and fifteen more sties are in course of construction. Since operations were commenced last year 350 pigs have been fattened and over 200 of these have been sold. It is estimated that in 1944, 630 pigs will pass through the sties. This latter number is approximately equal to the annual pig consumption of Suva 20 years ago.

At Nasinu Agricultural Farm too, very fine pig sties have been built almost entirely by Mr. Gordon, Mr. Stevens and the boys of the Juvenile Reformatory School. From 30 to 40 breeding sows and boars will be maintained on the farm where it is proposed that breeding operations only will be carried out, all weaned pigs being transferred to the sties of the Pig Fattening Scheme at Lami. This practice will lead to economy in sty accommodation at Nasinu and in the more profitable use of the abundance of camp swill available for the Lami venture.

Under existing arrangements with butchers, pig raisers are required to dispose of their pigs at about 120 lb weight or approximately six months of age at a time just when they are entering their period of greatest growth. It will be readily appreciated that as pigs grow in size their increase in weight daily is proportionately greater so that a pig in the period between six and nine months will increase in weight to a much greater extent than it did between three months and six months, so that by keeping pigs a few extra months much more pork will become available for food.

The objection to keeping pigs too long before slaughter has been due to the tendency for pigs to put on too much fat and the difficulty of getting smaller joints to meet household requirements. The latter difficulty can be overcome by adjustment between proprietors of licenced butcheries and housewives. Over-fatness may be controlled by feeding to the utmost on a good protein ration to a period within two weeks of slaughter. For the last two weeks the pigs should be kept on a reduced diet to take off excess fat. Pigs at this stage will be found to do quite well on a succulent grass ration. The advantage of keeping pigs to provide a carcase of up to 200 lb at nine months will be appreciated in these times of meat shortage.

Many questions will be asked as to what is to become of the greatly increased numbers of well bred pigs which will be in course of production at the end of the war. It is anticipated that this surplus pork will be converted into ham and bacon in a local factory. The demand for this class of food already exists and there is no technical difficulty associated with its manufacture. Hence all pig raisers should continue their good work and extend it as far as may be practicable.

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2. LOCAL FISH SUPPLIES.

Following the onset of war local fish supplies fell off considerably owing firstly, to the internment of Japanese fishermen who had been large suppliers of fish and secondly, war restrictions in regard to the movements of boats. This decreased supply has been felt for some time. The shortage became acute as a result of the greatly increased population during the last two years. The position in regard to fish supplies for the future, however, is much improved. This happy situation has been brought about as a result of the enterprise of a few of our local people. The first in the field for larger production was Mr. A. G. McCown of Ovalau, who fitted up two launches with regrigeration and went to considerable expense in obtaining equipment. Some very good catches were brought into Suva by Mr. McCown but unfortunately his effort has been restricted owing to the difficulty of obtaining suitable propulsion engines for his launches and to the difficulty of securing fishermen. Nevertheless, there is every hope that this venture will again become productive.

More recently Mr. D. Reimenschneider, with the co-operation of Government, has secured the ketch *Loloma* which he has fitted out at considerable expense with a refrigerated hold and appliances for fishing. There is no reason why this venture should not result in the putting on to the Suva market of several tons of fish monthly. Both Mr. McCown and Mr. Riemenschneider combine inshore fishing, using nets, with bottom fishing and trolling.

Through the industry of Messrs. Emberson, Terry and a few others who do week-end fishing, fairly large quantities of fish are being brought to Suva. The latter ventures did not require much capital outlay. Their boats are, however, fitted with ice boxes which enable them to remain at sea for from

one to three days and to return their fish to Suva in good fresh condition. Catches of 1,300 lb to 1,600 lb have been brought in recently by these smaller ventures.

The balance of the local fish supply is secured by the efforts of smaller fishermen operating from launches or punts without any form of refrigeration. These men are therefore unable to operate at long distances from Suva and are confined for the most part to in-shore fishing. Nevertheless they are responsible for the placing on the market of fairly large quantities of fish. The recently passed fishing Ordinance and Regulations have, so far, not become very effective in improving the position in regard to fisheries owing to lack of staff to carry out the provisions of the Ordinance and Regulations. At present also the collection of fees by Government in respect of licences has been waived. It is still necessary, however, for fishermen to licence themselves and their boats so that a record may be kept. The fishing licence is necessary also in order that the licensed fisherman may obtain a ration of petrol for use in his fishing boat.

The Prices Controller has recently issued an order setting out the retail prices of fish which are 1s. per lb for nuqa and 10d. lb for other varieties fresh, gutted, from the refrigerator. This means that the fisherman will receive about 8d. per lb wholesale and it will be remembered that the fixed price for fresh fish at the market is 8d. per lb. These prices seem very reasonable both to the fisherman and to the consuming public.

It is hoped that the supply of fish to the public from the sources described above will improve from now on, and particularly so should the supplies of new nets, which have been ordered, arrive shortly in the Colony.

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3. POULTRY.

Poultry production in this country has never been up to the requirements of local consumption. This has been due no doubt to the recognized difficulties of poultry keeping in the tropics. The difficulty of securing regular supplies of necessary food stuffs, the difficulty of controlling numerous annoying diseases of fowls, and the general lack of knowledge of the subject of poultry raising are factors which have kept back poultry production in this country.

To those who have been fortunate and industrious enough to build up flocks of poultry, the increased population consequent upon war and the correspondingly large demand for poultry products, has resulted in greatly enhanced profits. During the summer months demand for eggs and poultry carcases was many many times greater than local production could supply. An attempt was made in Suva to fix the price of eggs which, however, was not successful in preventing a black market. For a time egg distribution was very uneven and unfair amongst the different sections of the community. With the approach of the winter season and the increased production of eggs which occurs at that time the position has become very much better so that to-day practically all sections of the community are able to secure eggs at a price approximating that fixed by the Controller.

One very good result of the shortage which occurred during the summer has been the very great stimulus to poultry production which is now taking place. Practically all farmers and many townspeople are now busily at work with the interesting business or hobby of raising chickens. This stimulation will do much towards creating a better situation during the coming summer than was experienced during the last hot season.

Unfortunately, some disappointment has been experienced by the public who have sought to obtain supplies of breeding stock from the Nasinu Agricultural Farm. It has been found impossible to supply more than a very small proportion of the breeding stock requested by the public from Nasinu and to meet this demand the development of the flock at Nasinu itself has been somewhat restricted owing to over-sales. Nevertheless, this Government-operated farm is serving a very useful purpose and considerable development is anticipated in the near future.

During the last year the tendency has been to fix a standard price of 4s. a dozen retail for eggs. As stated before, this price was greatly exceeded in the black market. Nevertheless, even 4s. seems to the housewife very high for eggs, particularly in the flush season. It would appear that the best way of bringing the price down to a level more within the reach of the average householder is for as many householders as possible to raise their own poultry. The difficulty of feeding birds has been recognized and an article was published in the *Agricultural Journal*, Vol. 13, No. 3, page 76, on the subject of poultry feeding in war time, and a further study of this is recommended to those who would increase their poultry production. It may be mentioned, however, that a small flock can always be fed on ordinary kitchen scraps with very little additional purchased food—the best results, however, depend on generous balanced feeding.

ENTOMOLOGICAL NOTES.

By
R. J. A. W. LEVER, B.Sc., D.I.C., A.I.C.T.A., F.L.S.,
Entomologist.

1. CONCERNING THE DENGUE MOSQUITO, AEDES AEGYPTI L.

During May and June there was a fairly heavy outbreak of dengue in Suva, the total cases notified to the Medical Officer of Health being respectively 27 and 64, these figures excluding cases treated by private practitioners or otherwise unreported.

As is well known, this disease is transmitted by the mosquito *Aedes aëgypti* L., referred to in earlier writing as *Stegomyia fasciata*, *A. argenteus* or *A. calopus* and popularly as the tiger mosquito in allusion to the black and white marks on the thorax. It is interesting therefore to record that the places where this mosquito was found breeding in Suva in May and June were old meat tins, kerosene tins, an enamel dish and barrels or rain-water tanks.

Articles in recent numbers of the *Journal* have stressed that this essentially domestic breeder never fails to take advantage of tins of fresh water in which meat-safe legs are stood, flower vases or water in drip pans under ice boxes. A strict weekly emptying of all vessels containing water in houses would go a long way to checking this pest which is much commoner in Suva than in the country. Failing this a film of kerosene should always show on the surface of water in tins used in houses for the above purposes.

It is probably only human nature when pestered by this mosquito to blame distant sources of water as being the breeding places and to imagine that a drain, swamp or pool is the source of the trouble when the real locality is a neglected tin, bottle or rain drum in one's own compound. *Aedes aëgypti* is very rarely recorded from semi-permanent ground water not stored in some container or other.

From an historical point of view it is worth referring to a recent publication (1) where it appears that the original infection reached Fiji in 1885. In 1908 there was another outbreak, due apparently to ships from Queensland, and old residents who had suffered from the 1885 epidemic escaped infection twenty-three years later. This disease occurs in the Solomons, New Caledonia, Samoa and Hawaii so that Fiji is in the midst of other infected areas. Lumley shows (1) the average period of incubation in man is between 5 and 8 days and quotes work in the Philippines shewing that the mosquito can transmit dengue between 12 and 70 days after becoming infected. Taylor, dealing with the purely entomological aspect, has kept females alive for 90 days but males for not more than 60; six weeks under natural conditions is probably the average length of life. This shows that ineffective spraying of rooms permits *Aedes aëgypti* to infect inhabitants over a long period.

(1) Lumley, G. P. and Taylor, F. H.—1943. Publication No. 3, School of Public Health and Tropical Medicine, Sydney. April 9th.

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2. OBSERVATIONS ON CULICINE MOSQUITO LARVAE.

The writer recently acquired, through the courtesy of the American Medical Corps, some samples of water from three rivers on the northern coast of Guadalcanal, their estuaries all being within six miles of one another. These waters were analysed by the Senior Chemist as follows:—

	pH.	Nitrates per 100,000 parts.	Chlorides per 100,000 parts.
1. R. Tuumbutu (Lunga) ..	7·31	all less	1·1
2. R. Tenaru	5·57	than 0·001	0·8
3. R. Ilu	7·07		1880·0

(The native name of the most westerly river is Tuumbutu and it is so marked on Admiralty charts, though the planters' name of "Lunga" was adopted during the campaign of 1942 and appeared thus in the news).

For explanation of pH or hydrogen ion concentration, the interested reader is referred to the last issue of the *Journal* (1). Specimens of larval *Aëdes scutellaris* Wlk. *pseudoscutellaris* Theo. and *Culex fatigans* Wied. from Suva were reared to adults in the Tuumbutu and Tenaru samples but all larvæ died in the Ilu water with a high chloride value (salinity) doubtless due to the sample having been taken very near the mouth of the river. Samples of water from Suva were taken, again through the kindness of the U.S. Medical Corps, to the New Hebrides and used in rearing the malarial mosquito *Anopheles punctulatus* Dön. As Fiji water is suitable for development of their larvæ and pupæ the local argument often put forward that malarial mosquitoes cannot thrive in Fijian waters can be finally discredited.

The pale green larvæ of *Aëdes kochi* Dönitz have a specialised breeding place in rain water collecting in the leaf-axils of various plants. In Paine's 1935 bulletin (2) three species of such plants are given, viz. the large *Pandanus*, the smaller *Pandanus* or "voivoi" and the semi-wild aroid *Colocasia indica* or "via." When revising Paine's bulletin this year the writer (3) referred to these plants respectively as *P. tectorius* (Sol.) Rumph., *P. thurstonii* Wright and *Alocasia indica* Schott. In July 1943, the author took these mosquito larvæ from water in leaf-axils of another screw pine at a height of some 500 feet on the slopes of Mount Korobaba. This plant was kindly identified by Mr. B. E. V. Parham, M.A., as *Freycinetia* sp. near *pritchardii* Seem.. In Samoa, *A. kochi* var. *samoana* Grün. was recorded (4) additionally from axils of *Cyrtosperma* which plant is also a member of the Fijian flora.

The larva is seen to have a characteristic stiff, jerking movement with much less flexible wriggling than in the three commoner species of *Aëdes*, viz. *A. pseudoscutellaris* Theob., *A. ægypti* L. and *A. vexans* Meig. Other features are an almost cream-coloured siphon and clusters of reddish tufts along the sides of the thorax and abdomen. Small Copepod crustacea occur in the water which contains vegetable debris.

As showing the tolerance of mosquito larvæ to waters not normally available to them it is interesting to record that young larvæ of *Culex annulirostris* Skuse, artifically placed in brackish water in which larvæ and pupæ of *C. sitiens* Wied. occurred, were reared into normal adults. In a state of nature this water would have been saline enough to repel a female *C. annulirostris* from oviposition but the larvæ when placed there were adaptable enough to complete their metamorphoses.

In an attempt to save using oil, experiments were made with Paris green and mill tailings from a gold mine but the usual one per cent mixture failed to give control with *C. fatigans* Wied. in a slowly flowing stream with a mud-stone (" soapstone ") bottom and even two per cent dust of Paris green did not result in a complete kill. Russell and West (5) using charcoal as a carrier killed a " high percentage " of *fatigans* larvæ, but their experiments were in beakers and jars and a pond of still water.

Young stages of all but one of the fifteen indigenous mosquitoes were taken by Paine who records (2) that " the discovery in the field of *Mansonia* (*Taeniorhynchus*) *brevicellulus* Theob. is a matter of some difficulty and after a fairly wide search of 200 possible breeding places the failure to find them has been a great disappointment ". The writer has recently been fortunate in finding *Mansonia* larvae attached to the roots of reeds growing in an abandoned drain in a fairly large swamp at Namaka, Nadi. The peculiar siphon, mentioned by Paine as being inserted into the plant for breathing, is dark, pointed and thorn-like and unlike that of any other Fijian mosquito larva. Another character is the long, flexible proximal joint of the antennae which in mounted slides assumes a hook-like shape. Persistence in searching for these larvae is required as their habit of remaining attached to aquatic roots prevents them being readily taken in the dipper. Added to this was the fact that *C. annulirostris* were the predominant larvae in the swamp and might lead one to discontinue dipping for the scarcer *Mansonia*.

Copies of Paine's bulletin (2) should have the word *Taenuirgtbcgvs* on page 9, No. 5 deleted in favour of *Taeniorhynchus*.

Another of our scarcer mosquitoes is *Tripteroides purpurata* Edw. which has a strikingly interesting larva covered with stellate tufts of stiff, black hairs as well as a long thoracic spine situated in the same region as the thorn-like spur of *A. aegypti*. The larvæ were taken in a drum at Lami which was also the water place whence the first specimen was recorded by Bahr in 1911. Paine (2) gives the breeding place in Taveuni, Gau and Lau but Buxton (6) records additionally the former's discovery of larvæ in a tree hole on Moturiki Island, south of Ovalau. It is noteworthy that rare mosquitoes may occur in such common places as tins, Bahr's record referred to above being from an old kerosene tin in Suva which now is probably too built-up in the intervening thirty odd years to harbour *Tripteroides*.

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(6) Buxton, P. 1927. " Researches in Polynesia and Melanesia ". London Schl. Hyg. and Trop. Med. July.

3. SPREAD OF THE CABBAGE WHITE BUTTERFLY.

An article which appeared in this Journal in 1941 (1) mentioned that the cabbage white butterfly (*Pieris brassicae* L.) reached Australia in 1939. It soon spread from Victoria to Tasmania, reached New South Wales by May 1940, and by the end of that year was in South Australia. Despite quarantine regulations it managed to extend to Western Australia early in January 1943 (2) and the entomologist of that State says that "if not regulated it will cause serious damage to various vegetable crops".

The extension of this serious pest, in spite of measures designed to isolate it, is referred to here in view of an editorial which appeared in the local press (3). As the reason for the relaxation of our local quarantine permitting the importation of cabbages by the American forces is apparently not understood it is desirable to give the explanation. The cabbages are carried from New Zealand in ships' coolers at a temperature of 36°F. (i.e. only 4° above freezing point), transferred at once to trucks and driven away to the camp refrigerators where they are kept till required. Under these conditions the chances of the cabbage white butterfly becoming established are negligible and it is only because of these conditions, which cannot be duplicated by the civilian warehouses, that the relaxation has been made.

It should be stressed that the cabbage white butterfly is anything but the "problematical pest" referred to in the article mentioned and simply because it is not reported here is no reason for taking the risk of allowing in the vegetables in the ordinary way. By the time the pest is already in the Colony it would be already too late and one can repeat what was said in New Zealand that had it not been for the parasite (which had to be introduced from England to control the pest) "growing of rape, turnips and swedes would be rendered so uncertain as to be economically impracticable"(4). With this insect a serious pest in Hawaii, New Zealand and Australia we should be doing wrong if we took the risk of allowing cabbages in except under the present stringent mode of entry since were it to become established we should find our English and Chinese cabbages riddled with holes and unfit for consumption.

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(3) *Fiji Times and Herald*, 1943, June 10th.
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4. THE DIAMOND-BACK MOTH OF CABBAGE AND TURNIP.

Certain small green caterpillars found infesting cabbage and turnip leaves are the larvæ of the diamond-back moth, *Plutella maculipennis* (Curt). Although already written up(1) in 1939 it has become of increasing importance as additional ground is cultivated with cruciferous crops mainly for the military forces. Associated on the same leaves one often finds larger larvæ of *Crocidolomia binotalis* Zell. which is also a severe pest.

This small moth has now an almost world-wide distribution, occuring in New Caledonia, Tonga, having been in New Zealand for well over fifty years, and in Fiji for at least fourteen. If it had been known in 1924 it would almost certainly have been recorded by Veitch and Greenwood but the first mention is in Greenwood's third paper (2) published in 1929. This insect has been known for years in Europe and was recorded doing great harm to turnips in England in 1851.

The pale yellow eggs are laid on the lower surface of cabbage and turnip leaves which is an interesting difference from the same insect in South Africa where the eggs are said to be deposited principally on the upper surface and only occasionally on the under surface (3) though this is the only spot seen in Fiji. They hatch in three to four days to give rise to small spindle-shaped, green larvæ which reach a length of 2/5 of an inch in six to seven days. This period was at a mean monthly temperature of 78° to 79·7° F. which compares favourably with Hardy's (4) record of 7·25 days at a controlled temperature of 26° C. (78·8° F.)

This larval period is the destructive phase in which the leaves may be reduced to a network by the holes which are eaten, though the larvæ also burrow into the substance of the leaf, especially when just hatched. Severe infestations have the leaves covered with fine webs till the heart is eventually consumed with the centre of the plant full of droppings and useless commercially.

In Fiji the pupal stage lasts four to five and-a-half days with an average of 4·2, which compares with Hardy's four days at 28° C. (82·4° F.) in a cabinet and thermostat in England. The white silken cocoon spun by the adult caterpillar is of such an open network as to allow the developing pupæ clearly to be seen within; the colour changes from bluish-green to pale yellow. The total life history in Fiji during the hot season (December and January) is 3·2 + 6·8 + 4·2 or 14·2 days, i.e. just over two weeks. This is at Suva with a mean monthly temperature range of 74° to 83°, but the insect is an equally severe pest at Nadarivatu at a height of 2,740 feet with mean monthly temperatures varying from 64° to 74°. However, it has not been possible to remain there long enough to work out the life history which probably is a day or two longer. During August in Suva this period is 13 days.

The small moth, often to be seen in flight over the cabbages, is half an inch across the grey fore wings, whose posterior margin forms a zigzag pattern so that when the wings meet down the middle at rest the triangles on each side form diamond-shaped patches which suggested to Curtis the popular name of the moth in 1831.

Cultural control by the removal of old stalks or butts and destruction of unsaleable cabbages is very important to prevent reinfestation though this is often not carried out as thoroughly as it should be. Rotation of crops also helps, and should be practised whenever possible.

Chemical control with Paris green, lead arsenate and nicotine sprays have checked this pest and the heavy annual rainfall in Suva, averaging 120 inches, usually permits of spraying being safe up to three weeks before cutting. Dusting with one part of derris to eight of hydrated lime also gave some control but something better was looked for. Neither talc nor kaolin being available in the Colony, and finely-powdered soapstone being both too laborious to prepare and too heavy, an alternative carrier, mill tailings from a gold mine, was kindly provided by the Inspector of Mines. Chinese market gardeners seem completely wedded to nicotine sprays in some form and even combine it with arsenicals.

Realising the success that had been obtained with the Ichneumon parasites imported from England to New Zealand the Dominion Entomologist was approached and a small consignment of *Diadromus* (*Thyrœella*) *collaris* Grav. was kindly sent from Nelson in May and mass rearing begun. Excellent work is being carried out by Native Laboratory Attendant Philip Lewanavanua who bred up a stock during a period of shortage of the host caterpillar and liberations were carried out from June onwards, 240 having been released to the end of August.

Parasitisation by the female *Diadromus*—which is an orange-red wasp with black head, thorax and tip of the abdomen—is rendered easy by the flimsiness of the cocoon, which in addition is open at both ends. The period of development of the parasite within the host varies from 11 to 12 days, *Diadromus* being apparently less responsive to changes in temperature than its host as an experimental shipment which arrived in the hot month of March also matured in 11-12 days, as in June to July, though there was a variation of 5·9° and 7·7° F. (mean monthly temperatures) respectively between these months and March.

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5. FURTHER NOTES ON FIJIAN BUTTERFLIES.

In the last issue of this *Journal* (1) the Revd. E. G. Bucknill mentioned that while the eggs of the black butterfly *Euplœa helicita* Bdv. *escholtzi* Feld. are in Suva laid invariably on *Allamanda* leaves the caterpillars eat only maturer leaves of *Ficus* or fig. The writer of the article has since written to the author mentioning that at Apia, Western Samoa he has found *Euplœa* eggs laid on young *Ficus* leaves, the normal food plant, and this expected habit must of course, now be assumed to be the case in Fiji.

The well-known yellow butterfly with black wing-tips formerly known (2) as *Terias sulphurata* Butler has now been shown by the Imperial Institute of Entomology to be better referred to as *Eurema hecabe sulphurata* Butler. The larvæ eat leaves of the leguminous *Cassia* and *Sesbania* and may often be seen settled in large numbers on patches of mud or along river banks. Small swarms of this butterfly were seen along the Queen's road, Nadroga, in June last.

Even in gardens in the "built-up" parts of Suva leaves of sugar-cane are stripped by the rough green larvæ of *Melanitis leda* F.; in appearance the adult is reminiscent of the British meadow-brown and grayling butterflies but frequents shady places where it flies around tree trunks. The black eggs are laid in a straight line on the lower leaf surface.

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(1) Bucknill, E. G.—1943. *Agric. Journal*, Fiji, Vol. 14, No. 2, March.
(2) Veitch, R. and Greenwood, W.—1924. *Proc. Linn. Soc. N.S.W.*, Vol. 49, Part 2.

6. BEETLE BORERS OF TWIGS, ROOTS, SEEDS AND CANES.

When dealing with ambrosia beetles of avocado (1) the writer referred to a then unidentified borer taken in 1939 from a bridge post of *Casuarina nodiflora* on Vanua Levu. This insect has now been determined by the Imperial Institute of Entomology as *Crossotarsus externedentatus* Frm. Closely related beetles, also identified are *Xyleborus fijianus* Schedl. from avocado twigs and *X. torquatus* Eichh. from sugar cane stalks (2) thus making a total of eight species of *Xyleborus* in Fiji.

Besides four *Xyleborus* borers, the larger *Xylothrips religiosus* Boisd. and *Crossotarsus saundersi* Chap., the avocado tree is also attacked by the small *Hypothenemus peritus* Bldfd. besides *Lyctus parallelopipedus* Mels. and *Lyphia orientalis* Blr., a truly formidable list of beetles to attack an introduced fruit-tree whose branches and trunk must apparently be ideal for these shot-hole borers.

In a preliminary note (3) mention was made of a species of *Minthea* boring in the dried roots of stored derris. This has now been identified by the Imperial Institute of Entomology as *M. rugicollis* Wlk. also known from derris in Malaya (4) where its damage is rarely suspected till these powder-post beetles have begun to emerge from the bored roots. Associated with the larvae of the larger *Xylothrips religiosus* Boisd. is a grey Reduviid bug, determined also in London as *Peregrinator biannulipes* Montr. As this predatorial bug is similarly associated with these beetles in Malaya and is also found in the West Indies (4) it may be regarded as a local introduction.

The "sluggish brown Chalcid" recorded (3) as a pest of the larvae is *Proamotura aquila* Gir.

Besides the small *Coccotrypes* taken in Mount Victoria valley in seeds of *Podocarpus vitiensis* Seem. (5) there was also a species of *Cryphalus*—much larger than *C. jatropha* Samps. from twigs of *Acalypha wilkesiana* Muell.-Arg. (1),—which also suffers from boring by a species of *Ernophorus*.

The small Bostrichid *Dinoderus minutus* F. recorded (1) from the internodes of bamboo is becoming a pest due to the extended employment of split bamboo (*Schizostachyum glaucifolium* Munro) in native type buildings. The tunnelling and boring causes a fine dust to fall at the foot of the walls besides weakening the slats which have to be replaced. As kerosene or creosote, either sponged or soaked up, increases fire hazard it was recommended that the bamboo poles be allowed to dry before use or that they be soaked in water for three or four days in order to dissolve out the bulk of the attractive carbohydrates.

It will be realized that identification of insects in wartime is difficult not only on account of greatly reduced specialist staffs in London, the dispersal of collections in England in order to minimize loss in raids, but the double running of the gauntlet across the Atlantic by the specimens whose identification is required.

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DIVISION OF ENTOMOLOGY.

Annual Report for 1942.

By
R. J. A. W. Lever, B.Sc., D.I.C., A.I.C.T.A., F.L.S.

1.—Staff, Duties and Leave.

The staff consists of the Entomologist and two Native Laboratory Assistants, one of whom was given a month's local leave. The Entomologist was granted six week's sick leave in New Zealand after five year's continuous resident service. Petrol rationing was continued and subsequently tyre control.

2.—Chief Insect Pests.

The following pests were recorded: *Prodenia litura* F. on carrot, cabbage, lettuce, tomato, maize, dalo and egg plant; *Heliothis armigera* (Hbn.) on maize, bitter gourd and pea; *Agrotis ypsilon* Rott. on turnip; *Cirphis unipuncta* How. on rice and maize; *Plusia chalcites* Esp. on tomatoes and beans; *Nacoleia diemenalis* Guer. on beans; *Crocidolomia binotalis* Zell. and *Plutella maculipennis* (Curt.) on English and Chinese cabbages and

turnip; *Hymenia recurvalis* F. on beet and sweet potatoes; *Acritocera negligens* Butler boring in coconut spathes; *Levuana iridescens* B.B. on coconut leaves; *Nezara viridula* L. on beans and tomatoes; *Sogata furcifera* Horv. on rice and *Aulacophora coffeae* Horn on pumpkin and marrow. Stored products pests were: *Rhizopertha dominica* F. and *Calandra oryzae* L. in rice and flour; *Sitodrepa paniceum* L. from seeds of cumin (*Cuminum cyminum* L.); *Minthea rugicollis* Wlk. and *Xylothrips religiosus* Boisd. from dried derris roots; *Catorama herbarium* Gorh. from books and *Lasioderma serricorne* L. in dried bean pods and cabbage leaves. Insects attacking man were *Cimex hemipterus* F. in wicker work chairs in an hotel and the four common mosquitoes viz. *Aëdes aegypti* L., *A. scutellaris* Wlk. *pseudoscutellaris* Theob., *A. vexans* Meig. and *Culex fatigans* Wied. Attention was given to the danger of the possible arrival of *Anopheles punctulatus* Dön. in planes or ships from Melanesia.

3.—Introduced Beneficial Insects.

Liberations of parasites were 18,500 (11,000) of *Microphanurus basalis* Woll. for control of *Nezara viridula* L. and 46,800 (42,000) individuals of *Dirhinus* sp. against *Chaetodacus passiflorae* Frogg; figures in brackets are totals for 1941. *Microphanurus* was liberated at Naitauba and Kanacea and sent twice to New Caledonia by plane. Further good work was done by the Native Laboratory Assistants in arranging for a collection of *Plaesius javanus* Er. to go by plane to California for final liberation in Puerto Rico against *Cosmopolites sordidus* Germ. in bananas. Local releases were *Liothrips urichi* Karny to Tailevu and Naitauba for control of *Clidemia hirta* Don., *Telonemia scrupulosa* Stahl. to Taveuni against Lantana and *Platylister chinensis* Quensel. a total of 780 (450) including releases at Tailevu, Nasinu and Sawani. This Copriid beetle is a predator of house fly maggots in cow dung and was introduced from Java in 1938. Remains of pupal *Ptychomyia remota* Ald. were found under cocoons of *Levuana iridescens* B.B. on coconut leaves in a locality in Colo East. A second Tachinid was *Ceromasia sphenophori* Vill. from larval *Rhabdocnemis obscura* Boisd. in sugar cane.

4.—Local Parasites.

Apanteles antipoda Ashmd. was reared from larval *Cosmophila flava* F.; *Apanteles* sp. from *Axonoxena argaula* Meyr.; *Brachymeria fijiensis* Ferr. from larval *Nacoleia diemenalis* Guer.; *Sturmia inconspicuella* Bar. from *Prodenia litura* F.; *Sclerodermus* sp. from *Catorama herbarium* Gorh.; *Proamotura quila* Gir. from *Minthea rugicollis* Wlk. and *Diplazon laetatorius* (F.) from *Syrphus corollae* F.

5.—Insecticides and Insect Control.

Routine control of mealy bugs, scales, caterpillars, cockroaches, weevils, borers, bed bugs, fleas, mites and snails were carried out and supplies of insecticides were given both to Agricultural Officers and to members of the public.

The assistance of the U.S. Military Forces is acknowledged for help with insecticides and sprayers as well as transport facilities. Distribution of circulars in Chinese and Hindi is dealt with under section eight, Publications.

6.—Miscellaneous.

Six and a half weeks were spent in barracks during embodiment and a short course was later taken at a brigade training school. Lectures were given on pest control to Native Field Assistants and on mosquitoes to a U.S. medical unit. The Entomologist was appointed a member of the Mosquito Control Committee which sat thrice. A mongoose campaign was initiated with the

Director of Agriculture, and arsenic was provided; 6d. per tail was paid by the Government, £155 being disbursed. The good work of the two Fijian Laboratory Assistants was continued and is recorded as being most satisfactory. Travelling was again reduced to a minimum, only three tours of any distance being made and these were all on Viti Levu Island.

7.—Identification of Insects.

Acknowledgment is again made this year to the Director of the Imperial Institute of Entomology for identification of insects, 142 being determined compared with 195 for the year 1940-41. To the former Director, Sir Guy Marshall, C.M.G., F.R.S., the writer's thanks are due for eleven year's supervision over identifications of Melanesian insects. Of specimens sent to London 12 (7) were hitherto unrepresented in the British Museum collections, 8 (5) being species new to science: figures in brackets denote data for 1941. Other specialists who assisted were Mr. E. C. Zimmerman of Honolulu and Dr. J. W. Evans of Hobart, Tasmania.

8.—Publications.

Besides 13 short notes in the *Agricultural Journal*, the Entomologist, who continued as the Editor, wrote two articles, "Pests of the Vegetable Garden and Their Control" and "The Malarial Mosquito of Melanesia," and also revised for reprinting Paine's bulletin on mosquitoes. Some 50 copies of a brief article on control of pests of economic plants were printed in Chinese and 1,000 in Hindi; these were circulated among the vegetable gardeners and peasant farmers in all districts of the Colony.

9.—Rainfall.

The rainfall recorded at Suva during 1942 totalled 93·83 inches (143·74), being 27·03 inches less than for the previous fifty-six years. April (April) was the wettest month with 24·82 (45·45) inches and January (October) the driest with only 1·71 (2·81); data in brackets are for the previous year. There were no hurricanes in 1942.

AGRICULTURAL AND COPRA NOTES.

By C. HARVEY, B.Sc., A.I.C.T.A., Senior Agricultural Officer.

1. SUPPLIES OF FRESH PRODUCE TO THE MILITARY FORCES.

For the six months ending 30th June, 1943, the following quantities of locally grown fruit and vegetables were delivered to Military units in the Colony:—

Fruit	2,494,975 lb
Green vegetables	1,642,988 ,,
Root vegetables	2,178,760 ,,
Total ..	6,316,723 ,,

The ordering, collection, bulking and delivery of the whole of this, mainly produced by small growers, was arranged by the Fields Division of the Department and most of it actually passed through one or other of the collecting depots.

Approximately three-quarters of the total, including most of the fruit and root vegetables, was grown in the wet zone of Viti Levu and the balance in the dry zone; Kadavu and Beqa also supplied small quantities of produce.

Fijian growers supplied over 80 per cent of the fruit and an even larger proportion of the roots. Of the green vegetables, Indian growers contributed approximately half while Chinese and Fijian growers supplied one quarter each.

The season has been especially disappointing as vegetables and crops have been lost both from heavy rain early in the season and drought during the past six or eight weeks. There is also a probability that root crops will be in short supply for the next few months.

It is unfortunate that transport difficulties have made it impossible to arrange for the outlying islands to assist in the supply of fresh produce, which has not yet overtaken demand. Perishable produce from the islands can, as a rule, be accepted only if regular deliveries can be made. There is, however, ample scope for farmers in the islands to grow yams, kumalas and maize for occasional delivery and any who are interested should write to the Department for particulars of guarantees of purchase at minimum prices. —C.H.

2. VEGETABLE SEED SUPPLIES.

ADVICE has been received from seed merchants in Australia that the seed of certain kinds of vegetables are in very short supply just now. Market gardeners are therefore advised to make economical use of the seed they have and to raise their own requirements of those varieties that seed freely under local conditions:—

In very short supply:—Butter beans, runner beans, Chinese cabbage, carrot (especially Early Horn) and egg plant.

The following are in fair supply:—Cucumber (except Crystal Apple), cabbage (Drumhead only), lettuce, tomato, watermelon, radish, peas, rock-melon and dwarf French beans (except Tweed Wonder). —C.H.

3. THE PLANTING OF FOOD CROPS BY CANE GROWERS.

FOR the past two seasons the Colonial Sugar Refining Company has encouraged the planting of food crops for their own use by tenants and cane contractors with a view to their becoming at least partly independent of purchased foodstuffs for the duration of the war, thus relieving the demands on imported and other locally grown foodstuffs, particularly rice. Tenants are allowed to plant any short term food crops on their cane fallows, including rice where the tenant has no other suitable land conveniently available.

The scheme met with the discouragement, in the dry zone, of insufficient planting rains in the first season, and many rice plantings failed completely. The majority of cane farmers are in the dry zone, where the rainfall is somewhat precarious for rice growing under dry-land conditions; seed of recognised dry-land varieties was insufficient for all growers, and many of the latter had probably become unaccustomed to planting rice. During the 1942-43 season the rainfall was generally more favourable and greater success was obtained. In the Penang Mill area a general average of about 14 bags of padi to the acre was reported, though in the Ba, Lautoka and Nadi areas the yield was probably lower. In the Labasa Mill district disease and unfavourable conditions are reported to have resulted in very poor yields.

The following particulars of acreages of food crops planted by cane farmers during the past season have been supplied by the courtesy of the Attorney in Fiji and Managers of the Colonial Sugar Refining Company:—

District.	Acreage of padi.	Acreage of other food crops.	Total.
Lautoka .. .. } Nadi .. .. } Sigatoka	3,940	1,946	5,886
Ba	2,074	1,830	3,904
Tavua	638	388	1,026
Penang	514	346	860
Nausori	1,860	not given	1,860
Labasa	1,231	450	1,681
Total ..	10,257	4,960	15,217

These figures show that tenants are making a valuable contribution to the self-sufficiency of the Colony in food supplies. The acreage under padi is in fact sufficient to offset pre-war importations of rice, now unobtainable, given that fair average yields are obtained. It is, however, true that the rainfall in the northwestern districts is too uncertain for consistently good yields. For this reason it is important that cane growers in these districts should also maintain plantings of maize, kumalas and tapioca which should enable them to economise in the use of rice and sharps.

It is hoped that a wholehearted effort will be made to increase rice plantings in the coming season substantially.

4. PRODUCTION BY AREAS.

THE total Colony's production for export and for oil extraction in the Suva mill amounted to 8,034 tons in the first six months of 1943, compared with 6,100 tons in the same period of 1942 and approximately 15,000 tons as a pre-war average. The principal copra producing groups contributed as follows:—

Vanua Levu ..	47 per cent	Lomaiviti * ..	5 per cent
Taveuni ..	18 ,,	*Viti Levu ..	4 ,,
Lau	15 ,,	Rotuma ..	11 ,,

* Includes Kadavu and the Yasawas.

Loss of crop due to hurricane damage, aggravated by labour difficulties, is reflected in the low Taveuni and Lau production figures.

5. COPRA GRADING SUMMARY—2ND QUARTER, 1943.

Place.	Month.	Total number of bags presented for grading.	Number of bags.		Percentage.	
			Plantation.	F.M.S.	Plantation.	F.M.S.
Suva .. .. 1943.	April ..	6,463	4,360	2,103	68	32
	May ..	5,439	2,678	2,761	49	51
	June ..	7,760	3,676	4,084	47	53
	Total ..	19,662	10,714	8,948	54	46
Levuka .. 1943.	April ..	10,846	1,013	9,833	9	91
	May ..	13,696	1,328	12,368	10	90
	June ..	12,524	1,184	11,340	9	91
	Total ..	37,066	3,525	33,541	10	90
Savu Savu . 1943.	April ..	568	....	568	....	100
	May ..	590	14	576	2	98
	June ..	....	....	....	....	....
	Total ..	1,158	14	1,144	1	99
Grand Total ..		57,886	14,253	43,633	25	75

—C.H.

6. ADVISORY SUB-COMMITTEE FOR COPRA PRODUCTION.

The following gentlemen have been appointed as members of the above sub-committee of the Supply and Production Board: the Hon. Mr. H. B. Gibson, Messrs. A. Robinson, J. G. Taylor and S. H. Wilson. The Director of Agriculture as Chairman of the Production and Marketing Board, will look to the members of this sub-committee for advice in all questions affecting the production of copra. The sub-committee is representative of the main copra producing areas and should prove useful in safeguarding the interests of the producers.

SUVA VEGETABLE AND FRUIT PRICES.

By H. R. Surridge.

THE following list of prices covers the months of July and August and represents actual sales effected in the Cumming Street bazaar on Saturday mornings.

The variation in prices of native root vegetables was due, in the case of dalo, to the law of supply and demand, and in the case of yams mainly to variety. With local fruits, the season for mandarins and oranges being finished, the few late arrivals commanded correspondingly high prices.

Other prices appear to be reasonable for the season and produce offering. It should be remembered that seeds have been difficult to obtain owing to war conditions, and the growing season so far has been exceptionally dry.

Also, prices often depend on the purchaser, whether he or she is a good bargainer, the custom being for the Fijian, Indian and Chinese vendors to endeavour to charge Europeans more than other races.

NATIVE VEGETABLES.

Bele (Hibiscus)	1½d. per lb.
Breadfruit	¾d. per lb.
Coconuts	1d.—1½d. each.
Dalo	¾d.—1d. per lb.
Kumala	¾d.—1d. per lb.
Mustard	4d. per lb
Ota (fern)	2d per lb.
Rourou	1½d.—3d. per lb.
Tapioca	½d.—1d. per lb.
Vudi (banana)	3s. per bunch.
Yams	2d.—3d. per lb.

EUROPEAN VEGETABLES.

Beans—Butter	6d. per lb.
French	6d.—8d. per lb.
Long	2d.—6d. per lb.
Beetroot	3d. per lb.
Cabbage—English	6d.—9d. per lb.
China	3d. per lb.
Carrot	1½d.—3d. per bundle.
Cucumber	1d.—1½d. per lb.
Egg Plant	1d.—3d. per lb.
Ginger (green)	2d.—3d. per lb.
Kohl rabi	6d. per lb.
Lettuce	1d.—1½d. each.
Peas	7d.—9d. per lb.
Pumpkin	1½d. per lb.
Radish	3d.—6d. per bundle.
Spring onions	3d.—6d. per lb.
Tomato	6d.—9d. per lb.

FRUIT.

Granadilla	3d.—4d. per lb.
Lemons	3d. per lb.
Mandarins	1d.—6d. per lb.
Melon	2d.—3d. per lb.
Orange	6d.—8d. per lb and 3d. each.
Pawpaw	1d.—3d. each.
Pineapples	2d.—6d. per lb.
Bananas	3s. per bunch, 9d.—1s. per dozen

FREAK BANANA.

RECENTLY, Mr. H. B. Harricks, temporary Agricultural Assistant, reported a freak banana near Ba.

The plant showed a single stem carrying six normal but small bunches and is naturally regarded as a local curiosity. Such monstrosities occur occasionally but are not to be encouraged. —H.W.J.

REVIEWS.

1. NEW ZEALAND SERVICES VEGETABLE PRODUCTION.

AN interesting account of the organization of fresh vegetable supplies to military units in New Zealand is given by I. D. Blair in the *New Zealand Journal of Agriculture* of May 15th (Vol. 66, No. 5).

Although considerable deliveries have been made by private contractors, reliance for the bulk of the requirement appears to have been placed on a number of new market gardens operated by the Department of Agriculture. Twenty-two gardens are listed, ranging in size from 10 to 179 acres, with a total of 1,785 acres. The gardens are fully mechanized and employ some 500 workers, including a large proportion of women. The land was taken over in July 1942, and despite the fact that most of the land was under grass and had to be broken to the plough, deliveries of vegetables commenced in December and by February 1943, 1,300 acres of crop had been raised. By March, total deliveries had amounted to 6,125,632 lb of vegetables.

By contrast, in Fiji we have attempted to meet requirements of the military for fresh produce through an expansion in production by large numbers of small growers—Chinese, Fijian and Indian— by means of purchase guarantees at fixed prices, distribution of seed, insecticides and manures and provision of collecting depots and transport. Although the full requirement has not been met, the margin is comparatively small and climate is a limiting factor. During the period covered by the New Zealand figures given above (December to March) over 4,000,000 lb of locally grown fresh produce was delivered to the military forces in Fiji. This figure, however, includes fruit and native root crops and only one-third, approximately, consisted of vegetables of a type strictly comparable with the New Zealand production referred to. It is difficult to compare the respective efforts in terms of labour as the many thousands of producers in the Colony were also concerned in growing other crops, and some of them also undertook part-time employment in military work. Except where the first ploughing could be undertaken by tractor, hired out by the Department of Agriculture—and this was limited to a comparatively small acreage—mechanization was non-existent and hand labour had to be employed throughout. —C.H.

2. MINUTES OF 55TH MEETING OF THE COLONIAL ADVISORY COUNCIL OF AGRICULTURE, ANIMAL HEALTH AND FORESTRY.

At the above meeting, held at the Colonial Office on 6th April, 1943, a memorandum dealing with the principles of agricultural policy in the Colonies was discussed.

Mention was made of the paramount obligation to produce sufficient wholesome food for the people as the leading principle everywhere, followed by the need to ensure a cash income for farmers and to safeguard the soil and its fertility.

The good prospects offered by livestock as a means of providing valuable food in the Colonies was stressed as well as the need to maintain the technical efficiency of staffs of agricultural departments. A report of the Sub-Committee on cinchona development was formally accepted by the Council.

The report on the agricultural and veterinary scholarship schemes was accepted and Dr. Tempany stated that funds for this purpose had been assured for the next five years. The enlarged provision was required in view of post-war agricultural development.

The training of native African Agricultural Assistants was discussed as this type of officer was vital to progress in the Colonies and it was important that there should be a clear idea of the necessary standard of training.

The progress of research on the swollen shoot disease of cocoa was also discussed and it was agreed that cacao cuttings imported from various sources should be grown under quarantine conditions in the Gold Coast in an attempt to find strains resistant to the virus causing the disease.

Annual Reports of several Colonies including Fiji were also considered by the Council and it was decided that the work of technical officers in wartime was inadequately published and that this defect should be remedied if possible.

Irrigation and drainage in relation to agriculture were also discussed. It was stated that good progress had been made in Ceylon and Malaya but that the scope for the efficient use of water under control was very wide and would play an important part in the reconstruction after the war. It was agreed that attention should be directed to the proper training of hydraulic engineers.

Other subjects discussed included the improvement of native food crops by selection and breeding; the marketing section of the Nigeria Department of Agriculture; undulant fever of goats in Malta; the report from the Low Temperature Research Committee and the livestock side of agricultural development of the West Indies.

These brief notes give some idea of the wide scope of subjects dealt with by the Council which consists of eminent and experienced scientists.—H.W.J.

OBITUARY—SIR EDWIN BUTLER.

The death of Sir Edwin Butler, C.M.G., C.I.E., M.B., F.R.S., at Weybridge, England, at the age of 68 years, is recorded with regret.

A graduate in medicine and science of the Royal (now National) University of Ireland, he spent many years in India on mycological research work before being seconded to similar work in London where he founded the Imperial Bureau of Mycology (now Imperial Mycological Institute) and was its first Director until 1935, when he became Secretary to the Agricultural Research Council until he retired in 1941.

Sir Edwin was a very keen scientist with a very broad outlook on scientific development. He was genial and noted for his kindly regard towards his subordinates and his ever ready co-operation. —H.W.J.